

REMARKS

Claims 1-11, 18-20, and 25-30 remain in this application. Claims 25-30 have been added. Claims 1-2, 4-5, 9-11, and 18-20 have been amended. The added and amended claims are supported by the specification and no new matter has been added. No claims have been cancelled. The Applicants respectfully request reconsideration of this application in view of the above amendments and the following remarks.

Initialization Of IDS References

As a preliminary matter, either the Examiner did not indicate that several of the submitted patent references were considered and made of record by initialing the corresponding boxes on page 5 of the PTO-1449 form mailed January 4, 2002, or our version is missing page 5. In the Office Action, there was no indication that these references were not in conformance with MPEP 609. Consequently, the Applicant respectfully request that the Examiner indicate these references have been considered and made of record by initialing page 5 of the Form PTO-1449 submitted January 4, 2002 and return a copy thereof to the Applicant with the next Office Action.

35 U.S.C. §102(e) Rejection – Cirelli

The Examiner has rejected claims 1-11 and 18-20 under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,218,057 issued to Cirelli et al. (hereinafter referred to as "Cirelli"). Applicants respectfully submit that these claims are allowable over Cirelli.

As amended, **claim 1** recites "*a mask comprising a pattern to modify a circuitry feature exposed in a radiation sensitive layer by transmitting modifying radiation according to the pattern to a region of the radiation sensitive layer containing the*

circuitry feature to reduce a distortion of the circuitry feature”. Applicants respectfully submit that Cirelli does not teach or reasonably suggest transmitting radiation to a radiation sensitive layer that has already been exposed to radiation.

As discussed in the Abstract of Cirelli, “*a lithographic process for making an article such as a semiconductor device or a lithographic mask is disclosed. In the process, articles are fabricated by a sequence of steps in which materials are deposited on a substrate and patterned. These patterned layers are used to form devices on the semiconductor substrate. The desired pattern is formed by introducing an image of a first pattern in a layer of energy sensitive material. The image is then developed to form a first pattern. A layer of energy sensitive material is then formed over the first pattern. An image of a second pattern is then formed in the layer of energy sensitive material formed over the first pattern. The second pattern is then developed [emphasis added]. The desired pattern is then developed from the first pattern and the second pattern.*”

As understood by Applicants, the image of the first pattern is developed prior to forming the image of the second pattern. As clearly shown in Fig. 1 of Cirelli, the energy-sensitive photoresist 25 is completely removed, at step 3, which is prior to exposure to radiation to form the image of mask 40, which occurs at step 4. Accordingly, Cirelli does not teach or reasonably suggest a mask comprising a pattern to modify a circuitry feature exposed in a radiation sensitive layer by transmitting modifying radiation according to the pattern to a region of the radiation sensitive layer containing the circuitry feature to reduce a distortion of the circuitry feature.

Anticipation under 35 U.S.C. Section 102 requires every element of the claimed invention be identically shown in a single prior art reference. The Federal Circuit has indicated that the standard for measuring lack of novelty by anticipation is strict identity. “*For a prior art reference to anticipate in terms of 35 U.S.C. Section 102, every element*

of the claimed invention must be identically shown in a single reference.” In Re Bond, 910 F.2d 831, 15 USPQ.2d 1566 (Fed. Cir. 1990).

For at least these reasons, even without the above amendment, **claim 1** is believed to be allowable over Cirelli. **Claims 2-11** depend from claim 1 and are believed to be allowable therefor, as well as for the recitations independently set forth therein.

Independent **claims 18 and 25** are believed to be allowable for reasons similar to those discussed above. Dependent **claims 19-20** depend from claim 18, and dependent **claims 26-30** depend from claim 25, and are believed to be allowable therefor, as well as for the recitations independently set forth therein.

35 U.S.C. §103(a) Rejection – Wang or Capodieci or Inoue

The Examiner has rejected claims 1-11 and 18-20 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,544,695 issued to Wang et al. (“Wang”) or U.S. Patent No. 6,044,007 issued to Capodieci (“Capodieci”) or U.S. Patent No. 6,110,647 issued to Inoue et al. (“Inoue”). The Applicants respectfully submit that the present claims are allowable over Wang, Capodieci, and Inoue.

Claim 1 recites at least, “*a mask comprising a pattern to modify a circuitry feature exposed in a radiation sensitive layer by transmitting modifying radiation according to the pattern to a region of the radiation sensitive layer containing the circuitry feature to reduce a distortion of the circuitry feature*”. Neither Wang, Capodieci, or Inoue teach or reasonably suggest these limitations.

First, let’s consider Capodieci. As discussed in the Abstract of Capodieci, “*a data storage medium contains mask layout data for use in writing a mask includes a first mask data portion which corresponds to a feature having an interior corner. The first mask data portion corresponding to the interior corner includes a multi-level or stepped inner*

serif in the interior corner [emphasis added] which provides for improved writeability of OPC independent of process push or bias. Alternatively, the data storage medium contains mask layout data which includes a second mask data portion. The second mask data portion corresponds to a feature having an exterior corner and includes a multi-level or stepped outer serif on the exterior corner [emphasis added]. The stepped outer serif also provides for improved writeability of OPC independent of process push or bias”.

Accordingly, Capodieci discusses multi-level or stepped inner or outer serifs. As understood by Applicants, Capodieci does not teach or suggest a mask comprising a pattern to modify a circuitry feature exposed in a radiation sensitive layer by transmitting modifying radiation according to the pattern to a region of the radiation sensitive layer containing the circuitry feature to reduce a distortion of the circuitry feature.

Next, let’s consider Wang. As discussed in the Abstract of Wang, discussed is “*a photomask set and a photolithographic operation suitable for forming a desired pattern on a photoresist layer. The photomask set includes a plurality of photomasks each having a different pattern thereon. To form an overall pattern on the photoresist layer, each photomask is used in turn in a multi-exposure operation*”.

As understood by Applicants, Wang does not teach or suggest using a mask having a pattern **to reduce a distortion** of a circuitry feature exposed in a radiation sensitive layer. Wang does discuss assistant bars, hammerheads, serifs, and jobs (see e.g., column 3, line 63 through column 4, line 14). However, as understood by applicants, the assistant bars, hammerheads, serifs, and jobs do not modify a feature **that has already been exposed** in a radiation sensitive layer. Nor does Wang teach or suggest reducing a distortion of the feature.

Finally, let's consider Inoue. As discussed in the Abstract of Inoue, “*a method of manufacturing a semiconductor device, comprises the steps of forming a first transfer pattern corresponding to a mask pattern on a major surface side of a semiconductor substrate through a first mask plate on which the first mask pattern having a straight portion and a bent portion is formed, and forming a second transfer pattern corresponding to a second mask pattern on a major surface side of the semiconductor substrate through a second mask plate on which the second mask pattern having a pattern arranged at a position corresponding to the straight portion is formed*”.

As understood by Applicants, the first mask pattern and the second mask pattern are formed in **different layers**. As stated at column 4, lines 40-42, “[t]he wiring pattern 11 and the hole pattern 12 are constituted by different layers, respectively”. Applicants respectfully submit that, although not specifically stated, there would presumably be an intermediate development, and potentially other operations (e.g., etch) between the exposures. Since the masks are used to form patterns in different layers, as understood by Applicants, Inoue does not teach or suggest modifying a circuitry feature already exposed in a radiation sensitive layer. The layer would presumably be removed before forming the second transfer pattern.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

For the foregoing reasons, Applicants submit that the Examiner has failed to establish a prima facie case of obviousness set forth in MPEP Section 706.02(j). Specifically, the Examiner has failed to show that the prior art references teach or suggest all claim limitations.

For at least these reasons, even without the above amendment, **claim 1** is believed to be allowable over Wang, Capodieci, and Inoue. **Claims 2-11** depend from claim 1 and are believed to be allowable therefor, as well as for the recitations independently set forth therein.

Independent **claims 18 and 25** are believed to be allowable for reasons similar to those discussed above. Dependent **claims 19-20** depend from claim 18, and dependent **claims 26-30** depend from claim 25, and are believed to be allowable therefor, as well as for the recitations independently set forth therein.

Conclusion

In view of the foregoing, it is believed that all claims now pending patentably define the subject invention over the prior art of record and are in condition for allowance. Applicants respectfully request that the rejections be withdrawn and the claims be allowed at the earliest possible date.

Request For Telephone Interview

The Examiner is invited to call Brent E. Vecchia at (303) 740-1980 if there remains any issue with allowance of the case.

Request For An Extension Of Time

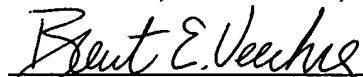
The Applicants respectfully petition for an extension of time to respond to the outstanding Office Action pursuant to 37 C.F.R. § 1.136(a) should one be necessary. Please charge our Deposit Account No. 02-2666 to cover the necessary fee under 37 C.F.R. § 1.17 for such an extension.

Charge Our Deposit Account

Please charge any shortage to our Deposit Account No. 02-2666.

Respectfully submitted,
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Date: APRIL 20, 2004


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